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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,225	10/31/2003	Dan-Hui Dorothy Yang	10021166-1	1504

7590 06/14/2005

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EXAMINER	
LUM, LEON YUN BON	
ART UNIT	**PAPER NUMBER**
1641	

DATE MAILED: 06/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/698,225	YANG ET AL.	
	Examiner	Art Unit	
	Leon Y. Lum	1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

/ Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed 29 March 2005 is acknowledged and has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 7-12, and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Butler et al (US 6,589,726 B1) in view of Lefkowitz et al (US 6,258,454 B1).

Butler et al reference teaches a solid support array with hydrophilic sites that are spatially segregated by hydrophobic sites (i.e. intervening areas), wherein the hydrophilic sites contain free amino groups (i.e. surface modification) that can support non-covalent attachment to biological entities including molecule (i.e. probe not forming a covalent bond and non-covalently attached to the substrate), and wherein solutions of reactants are added to hydrophilic sites using the drop-on-demand method that is analogous to the ink-jet printing technology (i.e. depositing solutions onto discrete sites), wherein the support can comprise a library of molecules (i.e. providing at least two solutions, each solution comprising a probe; probe that is different from at least one other probe in another solution), and wherein the reactions on the support can be protein-protein interactions (i.e. probe is a protein). See column 6, lines 11-35; column 10, lines 40-57; column 12, lines 52-53; and column 14, line 4.

However, Butler et al fail to teach that the surface modification layer comprises at least a first moiety having the structure –Si-R^1 and a second moiety having the structure –Si-L-R^2, and wherein R^1 is a chemically inert moiety selected from the group consisting

of C_3 to C_{30} alkyl and benzyl optionally substituted with 1 to 5 halogen atoms, L is a linking group, R^2 is a hydrophilic moiety.

Lefkowitz et al reference discloses the step of derivatizing a glass substrate with two compositions, n-decyltrichlorosilane (NTS) and undecenyltrichlorosilane (UTS) to produce two silanes, -Si-R^1, and –Si-$(L)_n$-R^2, wherein n is 1, wherein R^1 is chemically inert, and wherein R^1 is an alkyl group in the range of 2 to 24 carbon atoms, and may be benzyl, either unsubstituted or substituted with 1 to 5 halogen atoms, wherein L is a linker, and wherein R^2 comprises either a functional group or a modifiable group that can be converted into a functional group, in order to reduce surface energy and constrain droplets of liquid that are applied to a substrate surface. See column 2, lines 17-22; column 6, line 59 to column 7, line 58; and column 9, lines 45-51.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method and apparatus of Butler et al with the step of derivatizing a glass substrate with two compositions, n-decyltrichlorosilane (NTS) and undecenyltrichlorosilane (UTS) to produce two silanes, -Si-R^1, and –Si-$(L)_n$-R^2, wherein n is 1, wherein R^1 is chemically inert, and wherein R^1 is an alkyl group in the range of 2 to 24 carbon atoms, and may be benzyl, either unsubstituted or substituted with 1 to 5 halogen atoms, wherein L is a linker, and wherein R^2 comprises either a functional group or a modifiable group that can be converted into a functional group, as taught by Lefkowitz et al, in order to reduce surface energy and constrain droplets of liquid that are applied to a substrate surface. One of ordinary skill in the art at the time of the invention would have had reasonable expectation of success in including the step of

derivatizing a glass substrate with two compositions, n-decyltrichlorosilane (NTS) and undecenyltrichlorosilane (UTS) to produce two silanes, -Si-R^1, and –Si-$(L)_n$-R^2, as taught by Lefkowitz et al, in the method and apparatus of Butler et al, since Butler et al teach that the support substrate can be glass (see column 9, lines 26-27), and the silanes of Lefkowitz et al are also derived on glass substrates.

With regards to claims 8-9, Butler et al teach between 10-500,000 sites (at least 250 solutions). See column 6, line 8.

With regards to claims 16-17, Lefkowitz et al teach that the second silane, UTS, is 2.5 wt.% (i.e. about 0.5% to about 30% of the modification layer). See column 9, lines 45-50.

With regards to claim 18, Lefkowitz et al teach that R^2 may be a functional group such as hydroxyl. See column 7, lines 49-50.

6. Claims 2-6 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Butler et al (US 6,589,726 B1) in view of Lefkowitz et al (US 6,258,454 B1) as applied to claim 1 above, and further in view of Haab et al (Genome Biology, 2001).

Butler et al and Lefkowitz et al references have been disclosed above, but fail to teach the step of further drying the substrate after depositing the solutions.

Haab et al reference teaches the step of drying glass microscope slides for 1 hour at 80 °C in a vacuum oven, in order to produce antibody/antigen immobilized slides. See page 12, left column 3rd paragraph.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Butler et al and Lefkowitz et al with the step of drying glass microscope slides for 1 hour at 80 °C in a vacuum oven, as taught by Haab et al, in order to produce antibody/antigen immobilized slides. One of ordinary skill in the art at the time of the invention would have had reasonable expectation of success in including the step of drying slides immobilized with antibodies or antigen, as taught by Haab et al, in the method of Butler et al and Lefkowitz et al, since Butler et al and Lefkowitz et al teach proteins immobilized on glass slides, and the antibody of Haab et al is one type of protein that is also immobilized on glass slides.

With regards to claims 3-6 and 13, Haab et al teach a blocking solution of 3% non-fat milk/PBS/0.02% sodium azide. See page 12, right column, 1st paragraph. In addition, with respect to claim 4, since blocking solution is placed on the entire slide, the hydrophobic sites (i.e. intervening areas) are subjected to non-covalent binding.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Butler et al (US 6,589,726 B1) in view of Lefkowitz et al (US 6,258,454 B1) as applied to claim 11 above, and further in view of Silzel et al (Clinical Chemistry, 1998).

Butler et al and Lefkowitz et al references have been disclosed above, but fail to teach that each discrete site is in the range from 30 to 150 micrometers in diameter.

Silzel et al reference teaches jet-printed spots of antibody reagent having diameters of 100 μm, in order to reduce the size of binding assays for reduced costs,

faster chemistry, and equivalent or improved sensitivity. See page 2036, left column, 2nd paragraph; and page 2043, left column, last paragraph.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Butler et al and Lefkowitz et al with jet-printed spots of antibody reagent having diameters of 100 μm, as taught by Silzel et al, in order to reduce the size of binding assays for reduced costs, faster chemistry, and equivalent or improved sensitivity. One of ordinary skill in the art at the time of the invention would have had reasonable expectation of success in including spots of antibody reagent having diameters of 100 μm, as taught by Silzel et al, in the apparatus of Butler et al and Lefkowitz et al, since Lefkowitz et al teach molecule deposition by jet-printing techniques, and the antibody of Silzel et al is one type of molecule that can be deposited by jet-printing techniques.

Response to Arguments

8. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

Regarding pages 6-7 of the Remarks, Applicants argue that the combination of Haab et al with Lefkowitz et al does not teach the claimed invention since the polylysine coated surface of Haab et al bind non-covalently to antibodies and that Lefkowitz et al teach active groups that bind covalently to probe proteins, and that the antibodies of Haab et al would bind covalently to the active groups of Lefkowitz.

Applicants misinterpreted the previous Office Action as indicating that the probe proteins bind to functional moieties on R^2. It was the intention of the Office Action to reject claims 1 and 11 based upon the non-covalent binding of the antibodies of Haab et al to the R^1 silane of Lefkowitz et al. However, since Applicants have amended independent claims 1 and 11 and changed the scope of the invention, whereby the probe proteins specifically bind non-covalently to R^2, new grounds of rejection have been presented supra.

Conclusion

9. No claims are allowed.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Y. Lum whose telephone number is (571) 272-2878. The examiner can normally be reached on weekdays from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571) 272-0823. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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06/10/05